



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

December 11, 2009

Ms. Linda B. Shipp  
Senior Manager  
NEPA Compliance  
Environmental Permitting and Compliance  
Office of Environmental Research  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, TN 37902

Attn: Ms. Ruth Horton  
Senior NEPA Specialist

Subject: EPA's NEPA Review Comments on TVA's DSEIS for the "Single Nuclear Unit at the Bellefonte Plant Site" (November 2009); Jackson County, Alabama

Dear Ms. Shipp:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject Tennessee Valley Authority (TVA) Draft Supplemental Environmental Impact Statement (DSEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. TVA has identified an additional need for baseload capacity in the Tennessee Valley for the 2018-2020 timeframe. In response, TVA proposes to either complete or construct and operate one nuclear generating unit at the Bellefonte Nuclear Plant (BLN) brownfield site with a capacity of at least 1,100 MW and up to 1,200 MW, and an expected life cycle of 40 years. BLN is a 1,600-acre peninsular site located on TVA's Guntersville Reservoir in Jackson County Alabama near the town of Hollywood and city of Scottsboro. Three larger cities located within a 50-mile radius of the BLN site are Huntsville and Gadsden, Alabama, and Chattanooga, Tennessee.

EPA environmentally supports TVA's consideration of additional nuclear power in its power mix for the Tennessee Valley if impacts can be minimized and mitigated. Compared to conventional forms of fossil fuels such as pulverized coal, the use of nuclear power reduces overall air emissions – both criteria pollutants and emissions such as carbon dioxide associated with climate change effects. Although nuclear plants may have spent fuel disposal and safety concerns, we give deference to and assume facility safety compliance with the U.S. Nuclear Regulatory Commission (NRC) and TVA requirements and standards. We note that TVA currently operates three nuclear sites in the Valley with two or more reactor units each: Browns Ferry Nuclear Plant (BFN) on the nearby Wheeler Reservoir in Alabama, and the Watts Bar Nuclear Plant (WBN) and

Sequoyah Nuclear Plant (SQN) on the Chicamauga Reservoir in Tennessee. We believe that renewables, clean fossil fuel options and nuclear power will become more and more prominent and eventually replace conventional fossil fuels for power generation.

## Background

The TVA Bellefonte site has an extended history. The original TVA license application of 1973 to construct two nuclear reactors at BLN was made to the Atomic Energy Commission, pre-dating the NRC. Filing an application for an operational license followed in 1978. However, with construction for BLN Unit 1 (BLN 1) about 90% complete and for BLN Unit 2 (BLN 2) about 58% complete in the mid-1980s, TVA requested a deferred license status from NRC due to reduced growth forecasts. This deferred status was continued and NRC extended the construction permits to 2011 and 2014 for the two units. In the late 1990s, TVA also issued a "BLN Conversion EIS" to repower Bellefonte from a nuclear facility to a natural gas facility (i.e., combustion turbine plant). EPA provided comments on the DEIS and FEIS in 1997, although conversion construction did not go forward.<sup>1</sup> Subsequently in 2006, TVA submitted a site redress plan and NRC withdrew the construction permits. As part of the TVA redress plan and asset recovery program, unneeded portions of the Bellefonte site "were sold for reuse or abandoned in place" (pg. 4)<sup>2</sup> while others, such as a substation and training center, continued to operate. In response to more favorable power economics since 2005, TVA formally requested re-instatement of the construction permits for BLN 1&2 in 2009. Also, the earlier 2008 COLA ER proposed the Westinghouse AP1000 units BLN 3 and 4 at Bellefonte. On October 19, 2009, NRC conducted a site inspection for the requested deferred status and a response letter to TVA is pending.<sup>3</sup> Of note is that there was a lapse in quality assurance oversight during the period of permit withdrawal through March 2009, a fact that was entered into the Corrective Action Program.

TVA has not determined whether to complete an existing structure or construct a new structure for the proposed single nuclear generating unit. That is, one of the existing partially completed units could be completed using a Babcock & Wilcox (B&W) pressurized light water reactor technology as BLN 1 or 2, or a new unit could be constructed using a Westinghouse AP1000 (AP1000) advanced pressurized light water reactor technology proposed as BLN 3 or 4 in 2008.

Existing plant structures at BLN include several buildings (two reactor containment, two diesel generator, control, turbine, auxiliary, service and office buildings), a condenser circulating water pumping station, a river intake pumping station, two natural draft cooling towers, a transformer yard, a 500-kV and a 161-kV switchyard,

<sup>1</sup> TVA's interim consideration to convert to a natural gas plant was not documented in the present DSEIS in Section 1.2, but should be noted in the Final SEIS (FSEIS). However, we note that the BLN Conversion EIS was referenced in Section 1.7. BLN 3 and 4 should also be referenced relative to the 2008 Combined License Application Environmental Report (COLA ER).

<sup>2</sup> The FSEIS should summarize the equipment and structures that were sold and discuss how this might change the Exclusion Area Boundary (EAB) from previous analyses referenced in the DSEIS and whether the previous X/Q and dose calculations are still appropriate or must be re-calculated.

<sup>3</sup> NRC's findings regarding this site inspection should be disclosed in the FSEIS.

a spent nuclear fuel storage pool, sewage treatment facilities, a helicopter pad and railroad spurs. These facilities remain intact but some, such as one of the cooling towers, will need repair or upgrading. Potential work on existing BLN 1 or 2 is facilitated since neither were completed or irradiated when construction ceased.

### **Reactor Technologies**

The DSEIS considers the older B&W and the modern AP1000 reactor technologies as its two nuclear reactor alternatives for the proposed unit at BLN. These alternatives were the *Completion and Operation of a Single B&W Pressurized Light Water Reactor* (Alt. B) or *Construction and Operation of a Westinghouse AP1000 Advanced Pressurized Light Water Reactor* (Alt. C). Alternative B would maximize re-use of the existing, partially-constructed structures at BLN to complete the B&W reactor, i.e., primarily the re-use of one of the two started reactors (BLN 1 or 2). Alternative C would start construction of a new nuclear generation facility using an AP1000 reactor technology (BLN 3 or 4), although some reactor support facilities such as one of the two existing cooling towers could still be re-used.

EPA typically supports the re-use of materials and sites (brownfields/grayfields over greenfields). For the present proposal, re-use would be maximized by Alternative B where BLN 1 or 2 would be completed with the intended B&W reactor design. In this case, however, EPA is concerned that over 20 years have elapsed since construction ceased on BLN 1&2 in the mid-1980s, and that construction designs and materials as well as new inspection standards have significantly changed – especially for development of a nuclear generation unit.

Beyond the uncertainty of the structural integrity of the partially-completed BLN 1&2, it should be noted that the B&W technology is not as efficient and safe as the AP1000 technology (or equivalent). Compared to the B&W design, the DSEIS documents that an AP1000 reactor uses less radioactive fuel (1,821 fuel assemblies vs. 2,285) over a 40-year life cycle (Table 2-2) and therefore produces less spent fuel for disposal; needs fewer components (Fig. 2-8); has inherent public health safety features in its new “passive” safety design (Sec.2.3) with less potential radiological effects (Sec. 3.17) and design-based accidents (Sec. 3.19); and requires less water intake for cooling with less thermal discharge volumes.

### **Purpose & Need**

The purpose of the present SEIS is to notify agencies and the public that TVA proposes a major federal action to complete or construct and operate a single nuclear generating unit at BLN, and to document the resultant potential environmental impacts for this unit (pg. S-1). Although TVA may wish to add additional future units at the BLN site, only TVA's NEPA responsibilities for the proposed single BLN nuclear generating unit are covered in the present SEIS. Accordingly, additional TVA NEPA documentation would be needed for additional units at the BNL site (however, if reasonably foreseeable, the cumulative impacts of such additional units should be included in this FSEIS).

Moreover, we understand from TVA that NRC will subsequently develop its own NEPA document on the licensing process for BLN once TVA determines its selected reactor technology in its Record of Decision (ROD) for the present BLN SEIS.

## Alternatives

In addition to the above two nuclear generation alternatives (and the no action), power alternatives requiring or not requiring new generation, site selection alternatives, and transmission alternatives (with the no action) were presented in the DSEIS. Although these alternatives are further described in the enclosed *Detailed Comments*, we offer the following summary comments.

\* ***Suitability of Existing BLN Structures:*** If Alternative B is selected for the FSEIS, the suitability for re-using existing structures associated with the B&W reactor should be discussed. While EPA typically supports the re-use of materials and sites (brownfields and grayfields over greenfields), we are concerned that over 20 years have elapsed since construction was suspended on BLN 1&2.<sup>4</sup> While we defer nuclear plant safety to TVA and NRC, EPA has documented our re-use construction concerns in the enclosed *Detailed Comments*.

\* ***Reactor Technologies:*** The relative environmental and engineering merits of the B&W and AP1000 technologies are compared in the DSEIS. EPA finds that the modern AP1000 technology (or equivalent) is the preferred design for TVA's proposed nuclear generation unit at BLN. EPA prefers this type of AP1000 reactor (Alt. C) over the B&W design (Alt. B) despite the fact that more existing structures at BLN could be used (if found competent) by completing either BLN1 or BLN 2 with the B&W design.

\* ***"Green" Alternatives:*** With or without the present nuclear generation project, EPA strongly believes that green alternatives should continue to be promoted by TVA and that the FSEIS should summarize ways in which TVA is promoting such green alternatives, particularly efficiency/conservation and the addition of renewable capacity to support clean conventional baseload options. The FSEIS should also discuss how the amount of energy that could be saved or generated by these green alternatives would compare to the identified need and projected 1,100-1,200 MW capacity of the proposed BLN unit.

\* ***Alternate Sites:*** TVA screened several existing, brownfield and greenfield sites in its site selection process. We understand that co-location of the proposed nuclear unit at an existing TVA nuclear power station such as BFN may not be advisable due to cumulative thermal discharge issues at the same site and reservoir. Other potential co-locations at WBN and SQN apparently have onsite space conflicts. Former TVA plant sites (e.g., Hartsville Nuclear Plant site) are also not ideal since all or most of the

---

<sup>4</sup> Presumably because of new construction standards and other upgrades, the 90% and 58% completion levels for BLN 1&2, respectively, may translate into only a 55% and 35% completion level according to the internet (Wikipedia). The FSEIS should discuss this.

lands have now been sold to private developers. Finally, development of the Murphy Hill (MH) greenfield site would likely have more environmental impacts than development of the BLN brownfield site, even though MH was already partially graded before a proposed TVA gasification plant at MH was cancelled. Although these site options might be revisited for verification in the FSEIS, we agree that the availability of the BLN brownfield site for development with either Alternative B or C has environmental merit.

**\* *Transmission Upgrades:*** If Alternative B (B&W) or C (AP1000) is pursued by TVA, transmission lines and facilities would need to be upgraded through refurbishment (Option 1) or new construction (Option 2) to accommodate the 1,100-1,200 MW of additional electricity. We agree with the selection of Option 1 from an environmental perspective.

**\* *FSEIS Conclusions:*** In the FSEIS, TVA should confirm or modify its DSEIS preferred alternatives and select a preferred reactor technology.

### **Environmental Impacts**

Although additional EPA comments are provided in the *Detailed Comments* enclosure, we offer the following summary comments on the environmental impacts of the proposed nuclear generation unit at BLN.

**\* *Air Quality*** – One of the advantages of a nuclear power plant is that the criteria pollutants and climate change air emissions associated fossil fuel plants are circumvented or significantly reduced. As discussed in the *Detailed Comments*, our BLN air quality comments are therefore more procedural, relating to meteorological data; dispersion modeling assumptions, procedures, and inputs; use of the new PM 2.5 standard; and further substantiation of some conclusions.

**\* *Radiological Effects*** – As indicated previously, EPA prefers the AP1000 reactor design over the B&W technology. One of the reasons for this preference is that the AP1000 is inherently safer than the B&W design due to its advanced passive safety design. We have also provided additional comments on radiological effects in the enclosed *Detailed Comments*. These primarily focused on our requests for additional substantiation of provided dose calculations, tritium detection and the storage of spent nuclear fuel.

**\* *Waters of the US*** – It appears from the DSEIS that avoidance and minimization of adverse impacts to aquatic resources under the federal Clean Water Act (CWA) Section 404 are being taken into consideration appropriately. That the project would utilize existing structures and transmission corridors, to varying degrees based on alternatives, is a good approach to mitigation as a baseline. Whereas Alternative B (B&W) would not result in the filling of wetlands and Alternative C (AP1000) would impact 12.2 acres, operational safety and modernization considerations associated with the AP1000 design provide adequate justification for pursuing Alternative C if it is otherwise appropriate. Once an alternative is selected and TVA is ready to proceed, a CWA Section 404 permit application should be submitted that characterizes any wetlands and/or stream impacts,

along with a mitigation plan to address them. Also, since upgrading existing transmission line and facilities (Option 1) is preferred by TVA over new construction, we assume that there would not be any additional wetland impacts associated with project transmission upgrades.

**\* Surface Water** – Surface water withdrawals (“make-up water”) are needed to account for the proposed nuclear power unit’s evaporative losses, cooling tower drift and discharges (“blowdown”) to remove solids that accumulate in the cooling water. The Tennessee River (Guntersville Reservoir) would be both the source water for intake withdrawals and receiving waters for downstream discharges via a submerged diffuser (Figs. 3-2 to 3-5).

Although both the B&W and AP1000 technologies would operate in a closed-circuit mode and utilize one of the existing natural draft cooling towers to cool reactor cooling waters, thermal effluent would nevertheless be generated and discharged back into the Guntersville Reservoir receiving waters. Discharge of this heated blowdown is regulated by the State of Alabama National Pollutant Discharge Elimination System (NPDES) permit. This permit also prescribes thermal discharge limits, which are not to exceed a 92°F monthly average, 95°F daily maximum, and 5°F increase over ambient conditions. Hydrothermal modeling (pg. 94) appears to predict that the proposed nuclear unit would not exceed these limits for both Alternatives B and C outside the mixing zone, with the exception of infrequent and unusual hydrologic or meteorological conditions. The FSEIS should clarify and summarize if compliance with all three thermal limits is indeed predicted for both designs and what measures will be taken for compliance during unusual river flows and weather conditions (e.g., generation at less than nameplate capacity or temporary unit shutdown).

As suggested above, it is noteworthy that the AP1000 technology would require significantly less surface water than the B&W technology – 72% of the B&W withdrawal volume and 36% of the B&W discharge volume (pg. 95). The expected withdrawal rate for the B&W reactor is 34,000 gpm (75 cfs) and discharge rate is 22,650 gpm (50 cfs), while the withdrawal rate for the AP1000 reactor is 23,953 gpm (53 cfs) and discharge rate is 7,914 gpm (18 cfs).<sup>5</sup> Overall, this would result in a lower level of thermal pollution for Guntersville Reservoir, even if both technologies are predicted to comply with NPDES thermal limitations. Such relative differences in efficiency should be considered in TVA’s final selection of a preferred reactor technology, particularly if additional units would be added at BLN in the future causing cumulative effects.

In regard to chemical additives such as biocides and inhibitors added to the cooling waters to control fouling, EPA recommends that the minimum amount of chemical additives be used and that concentrations be monitored. We will defer to the State of Alabama’s NPDES permit regarding compliance with water quality standards for discharge effluents, and retain our federal permit oversight.

---

<sup>5</sup> Although a minor discrepancy, these “gpm” data suggest a difference of 71% and 35% as opposed to the 72% and 36% stated in the DSEIS.

**\* *Environmental Justice (EJ)*** – U.S. Census data for 2000 for the block group incorporating BLN showed a minority level (percentage) higher than the county average but lower than the state and national averages. Estimates for 2008 showed increases in minorities but with probably similar trends. U.S. Census poverty levels for 2000 and 2007 estimates showed a poverty level percent for the BLN area that is below county, state and national levels. EJ evaluations were made in the BLN Conversion EIS (1997) and were referenced (pg. 146). The more recent COLA ER concluded “...that any impacts would be minor and not disproportionate.” Moreover, “more recent data” with the same conclusion were also referenced, but not cited. The FSEIS should briefly substantiate these conclusions, rather than only incorporating by reference, and provide citations/timeframes. Also, any potential concentrations (“pockets”) of minority and/or low-income populations near the BLN site should be identified in the FSEIS. It should be noted that a potential EJ impact at BLN would make this site less environmentally preferable to EPA despite being an available brownfield site.

Regardless of the final EJ conclusion, TVA should provide public outreach on the project to all demographics living near the site during the SEIS process as well as periodic updates thereafter.

**\* *Induced/Secondary/Cumulative Impacts*** – Although TVA has identified a need for additional power by 2018-2020, supplying such power (1,100-1,200 MW) will likely accommodate or induce additional growth in the Tennessee Valley and result in developmental impacts. The FSEIS should acknowledge these expected secondary impacts as a project consequence.

Regarding cumulative effects, NEPA documents should discuss the past, present and reasonably foreseeable future projects (federal and non-federal) within the project area. This listing should focus on projects that impact the same resources as the proposal, with impacts being qualified and quantified to the extent feasible. In the case of the present BLN proposal, nearby projects with similar impacts (wetland, water quality and radiological impacts) should be emphasized.

We note that Section 3.13.10 discusses cumulative impacts, albeit only for socioeconomics, while other environmental consequences do not have a cumulative impacts section. This document format is somewhat cumbersome and could be streamlined in the FSEIS by designating only one cumulative impacts section that covers all relevant parameters.

### **EPA DSEIS Rating**

EPA rates this DSEIS an “EC-2” (Environmental Concerns, additional information requested): We primarily base this rating on the inherent uncertainties associated with a nuclear power unit.

## Summary

EPA supports TVA's consideration of additional nuclear power for the Tennessee Valley due to its reduced air emissions compared to conventional fossil fuel technologies. However, we will defer nuclear plant safety issues to NRC and TVA. For the proposed nuclear generation unit at the Bellefonte site, EPA prefers the AP1000 technology (or equivalent). EPA therefore prefers Alternative C (AP1000) over Alternative B (B&W). However, we also support the use of green alternatives (renewables, efficiency and conservation) if it can be shown that they can provide the identified power need in lieu of the planned nuclear unit, or if not, as a growing supplement to TVA's baseload capacity. Moreover, EPA favors the use of brownfields, grayfields and co-located facilities when feasible and new impacts are not thereby generated. We therefore agree that the availability of the BLN brownfield site for development has environmental merit. Finally, we concur that refurbishing transmission lines and facilities (Option 1) if all current regulatory codes can be met rather than constructing new ones is environmentally appropriate if the BLN project is pursued by TVA. In the FSEIS, TVA should confirm or modify its DSEIS preferred alternatives and select a preferred reactor technology.

Regarding project impacts for the proposed single nuclear unit, the FSEIS should provide additional background information for air quality impacts and radiological effects; discuss mitigation for BLN impacts to waters of the US (Alt. C); insure compliance with State NPDES thermal limits for heated effluent discharges by either reactor technology (Alts B or C); verify minor or no EJ impacts, and revise the cumulative impacts section.

EPA appreciates the opportunity to review this DSEIS. Should you have questions on our comments, please contact Chris Hoberg of my staff at 404/562-9619 or [hoberg.chris@epa.gov](mailto:hoberg.chris@epa.gov) for NEPA issues, and Stanley Krivo of the Air, Pesticides and Toxics Management Division at 404/562-9123 or [krivo.stanley@epa.gov](mailto:krivo.stanley@epa.gov) for air quality technical issues.

Sincerely,



Heinz J. Mueller, Chief  
NEPA Program Office  
Office of Policy and Management

Enclosure: *Detailed Comments*



## DETAILED COMMENTS

### Environmental Impacts

o *Air Quality* – EPA's air quality comments for the DSEIS are as follows:

+ Section 3.16.1.2 Local Meteorology (pg. 160)

\* *Meteorological Data (2006-2008)*: The discussion of the updated 2006-2008 meteorological data period does not provide a complete summary of the meteorological conditions. This discussion should be supplemented with tables and figures that provide applicable wind roses, frequency distributions, comparisons, etc. that would provide the reader with a better understanding of the current meteorological conditions. The tables and figures will also allow comparisons with previous observations and long-term records, and a basis for the evaluation of subsequent dispersion and transport analyses.

\* *Comparison of Meteorological Data Records*: The stability class frequency distribution is used to show agreement between different meteorological data records. EPA believes that this is not sufficient to show agreement. The data record comparisons should include joint frequency distributions of stability, wind direction, and wind speed.

+ Section 3.16.2.1 Dispersion (pg. 162)

\* *Section Contents/Title*: This section is concerned with both the dispersion and transport of effluent releases. Therefore, we suggest changing the name to "Transport and Dispersion".

\* *Transport and Dispersion Modeling Procedures*: The atmospheric transport and dispersion modeling procedures, computer model, and input parameters used to develop the provided dispersion estimates should be provided. Explanations may be needed for some of the input parameters (e.g., modeled receptors). An appendix could be used for this information.

\* *Figure of Reactor Plant Layouts*: A figure providing the plant layout, release vents, building heights, and receptor locations, for both the B&W and AP1000 reactor units would be of value in understanding the information provided. We recommend inclusion of such a figure in the FSEIS.

\* *Define Symbols*: The definition and importance of calculated X/Q, X/Q no decay undepleted, X/Q 2.26 day decay undepleted, X/Q 8.0 day decay depleted, and D/Q values provided in Tables 3-14, 15, and 16 should be explained.

\* *Receptor Type and Locations*: The receptors of interest in Tables 3-14 and 3-15 (e.g., nearest cow, garden, goat, etc.) for the B&W reactor appear to be different

depending on the location of the release. Some of these locations appear to be inside the EAB. An explanation should be provided.

Table 3-16 has four receptor types at the same location which appears to be within the EAB. This table also has a new column "Maximum Receptor Type Value". The FSEIS should explain these items.

The reason routine releases (i.e., Tables 3-14, 15 & 16) used the maximum modeled dispersion values while the accidental releases provided in Tables 3-17 and 18 use the 50% probability values should be explained. Because the accident releases are concerned with mostly short-term periods (i.e., less than 24 hours), the maximum values would appear to be appropriate.

\* *Release Boundary*: The "release boundary" used to determine the distance of interest for the accidental release X/Q values should be explained. It appears that the release location used for the previous routine releases could be used.

+ Section 3.16.3 Affected Environment – Air Quality (pg. 164)

\* *Auxiliary Equipment Emissions*: This section does not address the anticipated emissions from the auxiliary equipment except by referencing the 1974 TVA Final Environmental Statement (FES). The FSEIS should include/provide the appropriate emission values and impact assessments for these project emissions.

\* *New PM 2.5 Standard*: This section indicates that the new PM 2.5 24-hour National Ambient Air Quality Standards (NAAQS) was not addressed in previous documents. This new standard should be addressed in evaluating the project PM 2.5 impact in the FSEIS.

\* *PSD Class I Areas*: Class I Areas beyond 100 km should not be eliminated from impact consideration. The need to perform Class I area impact assessment depends on the magnitude of the emissions and the distance to the receptors of concern.

o *Radiological Effects* – We offer the following comments.

+ Section 3.17 Radiological Effects of Normal Operations (pg. 167) – This section indicates recent dose calculations confirm the earlier 1974 assessment for the B&W reactors so the 1974 impacts are applicable for the proposed project. The DSEIS contains no demonstration for this conclusion. The recent dose calculations should be provided along with comparison to the referenced 1974 assessment to demonstrate this conclusion. An appendix could be used to provide this needed documentation.

+ Section 3.17.3.2 Radiation Doses Due to Gaseous Effluents (pg. 173) – The stated purpose of this section is to revise the inputs and methodologies used in the 1974 FES to use current values representing recent meteorological, population and agricultural data. It also provides gaseous effluent doses for the AP1000 unit. This section should provide

the modeling procedures, computer model, and input parameters etc. used to develop the provided doses. An appendix could be used for this information.

+ Section 3.19.1 Design-Basis Accidents (pg. 197) – The purpose of this section is to update the accident dose consequences given in the previous BLN Units 1 and 2 Final Safety Analysis Report (FSAR) (TVA 1991) using atmospheric dispersion values based on current meteorological data and to present corresponding results for the AP1000 unit. The second paragraph on page 199 indicates this was not done directly through re-modeling but by using previously reported doses scaled by 50 percentile X/Q values using the more current meteorological data period. Confirmation is needed that all other parameters used in the dose assessments remain unchanged for the two reactors (e.g., EAD and LPZ distance for each reactor, the Q values, etc.).

+ Tritium – Undetected levels of tritium in the liquid pathway in the vicinity of some of the currently operating reactors has been an ongoing concern. The levels of tritium released via the liquid pathway annually for either the B&W or AP1000 reactors listed in Tables 3-23 and 3-24, respectively, should be monitored closely and actions levels put in place as these numbers are approached. As an example, for the AP1000, if 50% of the estimated annual release of 1010 C/yr is reached, more frequent environmental monitoring and/or sampling should be conducted. Additionally, if necessary, TVA may need to re-evaluate the operational parameters of the reactor and its associated liquid waste treatment systems. Guidelines for the need to increase the frequency of monitoring for tritium based on predetermined action levels should be addressed in the TVA Radiological Environmental Monitoring Program (REMP), if they are not already included.

+ Spent Fuel Storage – An ongoing, long-term issue is the projected storage of spent nuclear fuel onsite until late in the 21<sup>st</sup> century, addressed in Section 3.18.2. Although the NRC has determined that this can be done safely for an extended period of time with little risk to the public, it is desirable but not certain that a high-level waste repository will be licensed prior to the need for an onsite spent fuel storage facility in 2036.

+ Other – The basis and documentation for the dose calculations should be provided. An appendix could be used to provide this information.

o Noise – We offer the following noise comments:

+ Cooling Towers: Page 142 indicates that operational noise generated by the cooling tower is expected to be 48 dBA at the nearest residence (similar to ambient levels) and 54.6 dBA if the tower was operated 24 hours a day. The FSEIS should define the frequency of operation associated with the 48 dBA level and the basis of such an operational timeframe.

+ Noise Metric: The noise metric used in the DSEIS is unclear. That is, are the provided data in dBA instantaneous or averaged, such as the day-night level (DNL) descriptor? We assume the readings are in DNL but should be clarified in the FSEIS

(e.g., “48 dBA” could be designated as “48 DNL”, “48 dBA DNL”,  $L_{dn} = 48$  dBA, or an introductory sentence indicating that all noise data are expressed in DNL).

+ **Blasting:** Blasting may be associated with construction of the AP1000 reactor. The FSEIS should provide additional information on the expected noise levels during blasting at the nearest residence and the frequency of such events.

+ **Residences:** Approximately how many residences are located in the proximity of the “nearest residence”? Are homes isolated or clustered?

## Alternatives

In addition to the no action, two nuclear generation alternatives (completion of a B&W reactor or a new AP1000 reactor) were considered for BNL. Both technologies are predicted (pg. 15) to save the public user money in terms of cents per kilowatt (cents/kWh) by 2020 (B&W) or 2023 (AP1000). In addition, alternatives requiring or not requiring new generation, site selection alternatives, and transmission alternatives were considered in the DSEIS. We offer the following.

o **Nuclear Generation Alternatives:** Three nuclear generation alternatives were presented.

+ Alternative A (No Action) – Under the No Action Alternative, TVA would continue to maintain construction permits for BLN 1&2 in deferred status and not initiate any further site construction at this time.

+ Alternative B (Completion and Operation of a Single B&W Pressurized Light Water Reactor) – Alternative B would maximize re-use of the existing, partially-constructed structures at BLN to complete the B&W reactor technology. These primarily include the re-use of one of the two started reactors (BLN 1 or 2), with BLN 1 construction intentionally being about two years further along than BLN 2. Some 400 acres of the 1,600-acre site were disturbed during the initial construction of BLN 1&2.

+ Alternative C (Construction and Operation of a Westinghouse AP1000 Advanced Pressurized Light Water Reactor) – Alternative C would start construction of a new nuclear generation facility using an AP1000 reactor technology. An additional 185 acres of the BLN site would need to be cleared. However, several existing structures at the site could still be re-used. These primarily include the re-use of one of the two existing cooling towers; however, they also include reactor supporting structures such as the intake channel and pumping station, blowdown discharge structure, transmission lines and switchyards, barge dock, railroad spur, and meteorological tower.

o **Alternatives Requiring or Not Requiring New Generation:** Other alternatives requiring or not requiring new generation capacity were also considered (pp. 46-47). Those alternatives requiring new generating capacity included power generation through coal-fired and natural gas plants as well as renewables. We agree that nuclear power

would generate less emissions than coal and natural gas and that that renewables are still intermittent, and that such “green” power may need to be purchased by TVA. Moreover, those alternatives not requiring new generation included repowering of existing plants, increasing efficiency and demand side management (energy conservation), and reducing peak demand. TVA concluded that these options were already ongoing and that the addition of nuclear facility at BLN would continue to diversify TVA’s energy resources and reduce energy source uncertainties, consistent with TVA’s Energy Vision 2020 EIS.

**o *Site Selection Alternatives:*** Regarding the site selection process, several brownfield and greenfield sites were screened. These included co-location with existing TVA nuclear plant sites (BFN, WBN and SQN) which TVA generally found unacceptable because of reservoir thermal issues, the unavailability of some sites due to space or planned changes, and the availability of assets at BLN. In addition to BLN, several brownfield sites in Tennessee were also considered. These were the former Hartsville Nuclear Plant (HVN) site on Old Hickory Reservoir, the former Phipps Bend Nuclear Plant (PBN) site on the Holston River, and the former Yellow Creek Nuclear Plant (YCN) on the Pickwick Reservoir. Although these sites have highway access and prior site characterizations, they have been sold or partially sold and therefore would need to be re-acquired by TVA for power plant development. The considered Murphy Hill (MH) greenfield site on Gunter’sville Reservoir was a former selected site for a coal gasification plant (1981 TVA FEIS). Although some grading had been done before the project was cancelled, the DSEIS suggested that more impacts can be expected at a greenfield site such as MH than at a brownfield site such as BLN. Although we generally agree, given that the MH site was partially graded, the differences between MH and BLN may not be as significant. However, if BLN 1 or 2 were re-used, there could be a significant benefit to selecting BLN.

**o *Transmission Alternatives:*** With the addition of 1,100-1,200 MW of power, the existing transmission line and stations would need to be upgraded if Alternative B (B&W) or C (AP1000) were implemented. Two action options were screened: Option 1 would upgrade existing facilities while Option 2 would construct new facilities. Since the latter would cost twice the price of the former, only Option 1 was carried forward. Option 1 would re-energize the 500 kV transmission lines and switchyard and would be implemented over the no action if TVA decided to implement Alternative B or C.

### **EPA Re-Use Recommendations**

While EPA typically supports the re-use of materials and sites (brownfields over greenfields), the fact that over 20 years have elapsed since construction ceased on BLN 1&2 in the mid-1980s may be of concern in terms of construction design and material upgrades as well as new inspection standards, especially for a nuclear plant facility. That is, if portions of the partially completed structures for BLN 1 or 2 are to be used for the present project, we offer the following areas of review to help insure construction competence for a nuclear generation unit at BLN.

o **Building Codes & Inspections** – The condition of the existing facilities at BLN 1&2 should be inspected. Existing utilities at the two unfinished facilities could include mechanical, plumbing, electrical, and telecommunications equipment and their respective distribution systems. The condition and capacity of existing boilers, chillers, air handlers, duct work, plumbing fixtures, piping, transformers, generators, power panels, and wiring are a few of the items that should be carefully examined to determine if they have any remaining usable life or if they should be replaced, and what costs might be involved. In this regard, it should be noted that NRC's standards for safety requirements may have changed since construction on BLN 1&2 was suspended.

Similarly, what is the status of Building Code compliance and what code(s) (e.g., International Building Code: IBC) is/are in effect? The existing facilities/structures may require upgrades to render them in full compliance with current building codes. Since building codes are constantly being revised to include more stringent requirements, this could result in significant additional construction costs. The assessment of any Bellefonte structure/facility being considered for re-use should include a complete building code analysis.

o **Asbestos** – EPA has identified numerous construction materials that may contain asbestos (<http://www.epa.gov/region4/air/asbestos>). Although the use of asbestos containing materials is currently illegal, such materials were used until about 1980. If asbestos is determined to be present in existing BLN 1&2 facilities, abatement may be required for re-use, which may be costly.

o **Structural Condition** – Given that a nuclear generating unit is being proposed, the structural condition of the existing facilities is probably the most important issue. Has a complete structural engineering and safety assessment of the major structures been done, especially for the two partially-built, pressurized water reactors? As suggested above, building codes are frequently upgraded to include more stringent requirements for the structural resistance to natural forces (tornados, earthquakes). NRC has apparently upgraded their seismic design for nuclear power plants (2000) since the Bellefonte plant was first started ([http://www.riskeng.com/PDF/New\\_Seismic.pdf](http://www.riskeng.com/PDF/New_Seismic.pdf)). In addition, are there complete construction materials and inspection records of the initial construction available for compliance reviews (compressive strengths, slump tests, reinforcing steel inspections, welding records, etc.)? Were "as-built drawings" prepared after construction? Has there been any measured subsidence or settlement of the structures/facilities?

Other structural-related considerations include infestations, roofing integrity and pavement structures. Regarding infestations, do the structures have a history of water infiltration, either through roof leaks or at window and door openings? Are any structures affected by mold and/or termites? Similarly, the structural integrity of roofs is also important. Although roofing integrity may be sound, it is critical to assess the weather-tight integrity of the finished roofing system and materials, including its age, repair history, and its replacement cost. Any needed roofing replacement or repair costs should be addressed as part of the project's development costs. Finally, regarding

pavements and hard stand areas, an analysis of all flexible, rigid and special pavement types should be performed, with remaining life determinations made.

o **Weather/Climate Events** – As suggested above, tornados, earthquakes and other weather/climate events since the mid-1980s could be important in determining the re-use suitability of BNL 1&2. The BNL site is located in an F-3/F-4/F-5 tornado alley, according to [http://upload.wikimedia.org/wikipedia/commons/3/35/Tornado\\_Alley.gif](http://upload.wikimedia.org/wikipedia/commons/3/35/Tornado_Alley.gif). Moreover, in April of 2003, this area<sup>6</sup> experienced an earthquake of a 4.9 Rickter Scale magnitude. Did this event result in any structural damage at the BLN facilities? Similarly, did the recent flooding events in the summer of 2009 cause Guntersville Reservoir to flood at Bellefonte and cause structural damages for the existing facilities? Also, does the current site design and layout meet requirements for capture and treatment of onsite stormwater? We note (pg. 37) that structures on the “nuclear island” portion of the BLN site are designed to withstand “...hurricanes floods, tornados and earthquakes without loss of capability to perform safety functions.”

o **Impact Analysis** – Were the existing facilities designed and constructed to survive the impacts of large commercial aircraft? Advances in power station designs have occurred since the 9-11 terrorism event. Will the partially-built facilities to contain the pressurized water reactor meet (or can they be modified to meet) the current standards for this? Also see: <http://www.nrc.gov/reading-rm/doc-collections/news/2007/07-127.html>.

#### Other Comments

o **NEPA Process** – Because of the new BLN site development plan, the large number of supporting documents containing important basic information/analyses, and the more than 3.5 decades over which these reference document have been developed, a stand-alone complete SEIS containing all pertinent information and backup analyses appears to be appropriate for this project. The present DSEIS for the current single nuclear reactor configuration does not provide the information and supporting documentation needed for a complete understanding and evaluation by licensing agencies and the general public. In lieu of a complete stand-alone SEIS, the FSEIS should provide the specific document, section, and page where referenced documentation/analyses can be obtained to support the information provided. If appropriate, the specific NRC docket website location should also be provided.

o **Benzene** – On page 97, the molluscicide entry includes this description: "a nitrogen atom with four attachments, some or all of which can be benzene-based, rather than hydrocarbon-based." Since benzene is a hydrocarbon, this statement should be revisited for the FSEIS.

o **Terminology** – The name of Alternative C is somewhat inconsistent in the DSEIS. Typically, it is listed (e.g., pg. 36) as *Construction and Operation of a Westinghouse AP1000 Advanced Pressurized Light Water Reactor*. However, the technology is also referred to (pg. 188) as the *Westinghouse Advanced Passive pressurized water reactor*

---

<sup>6</sup> The earthquake epicenter was located some 37 miles southwest of Chattanooga, TN (internet).

(AP1000). Although the FSEIS should clarify, we assume that the AP1000 design is an “advanced passive safety” system.

- o **Table 1-3** – The information provide in this table (*Environmental Reviews and Documents Pertinent to Bellefonte Nuclear Plant Unit 1*: pg. 19) is not limited to Unit 1. Therefore, “Unit 1” should be removed from the title.

- o **Figures** – Assumed Figure 2-1 is not numbered in the DSEIS. Also, we suggest that Figures 3-2, 3-3, and 3-4 label the identified “submerged diffuser” area as the plant discharge site for clarity, as was done in Figure 3-5.